

Serial No. 09/940,247
Docket No. NEC 2360
Amendment B under Rule 116

REMARKS

Claim 1 has been amended to incorporate the limitations of claim 2, and also to specify that the etching solution consists of a three-component mixture of specified concentration ratio.

Claim 2 has been amended to clarify that the silicidized cobalt film layer is selected from dicobalt silicide, cobalt monosilicide and cobalt disilicide. No new issues have been raised that would require further search by the Examiner.

The rejection of claims 1-5 under 35 USC §103 as obvious over Suguro (US Patent No. 6,033,537) in view of Lee et al. (US Patent No. 6,074,960) is respectfully traversed. As acknowledged by the Examiner, Suguro fails to explicitly specify a concentration of hydrochloric acid, hydrogen peroxide and water in the range of 1:1:5 to 3:1:5, a solution temperature of 25-45°C at an etching time of 1-20 minutes (Detailed Action, p. 3, para. 1). Lee et al. does not supply the missing teachings. Lee et al. teaches that "[t]he wet etching of unreacted cobalt and underlying metal nitride portions is performed using either a single step embodiment using a single solution including a mineral acid and a peroxide, or is performed using two solutions in a two step process" (col. 5, lines 48-52). In Lee et al.'s single solution embodiment, which the Examiner discusses in the Office Action, "the etching [of the cobalt and metal nitride portions] is carried out at temperatures ranging from 20°C to about 100°C" (Col. 5, lines 61-64), "at a preferred etch rate ... greater than about 1000Å per minute for unreacted cobalt." (emphasis added) (col. 6, lines 9-11). Even assuming, as the Examiner contends, that "the thickness of the cobalt layer is 1000Å" (Detailed Action, p. 3, para. 2), an etching rate of greater than 1000 Å per minute would place the etching time below one minute. This places

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Lee et al. just outside the etching time range specified by Applicant's claims. Thus, no combination of Suguro and Lee et al. could achieve Applicant's claimed invention.

Moreover, and with regard specifically to the Examiner's suggestion that Lee et al. teaches the etching rate of cobalt changes depending on the soaking time/etching time and temperature, actually, what Lee et al. teaches at col. 7, lines 46-48 is that the etch rate of cobalt in a solution of HCl and water decreases with soaking time but increases with temperature. There is no teaching or suggestion contained within the four corners of Lee et al. as to the effect of soaking time/etching time and temperature with respect to a three component etching solution of hydrochloric acid, hydrogen peroxide and water.

It must be remembered that the present invention concerns chemical reactions, i.e., etching reactions, which are notoriously unpredictable. Indeed, the applied prior art, such as Lee et al., demonstrates the criticality of controlling the makeup of etching solutions, etching temperatures and etching times. See, in particular, col. 7 of Lee et al. If anything, Lee et al. stands for the proposition of the criticality of controlling etching solution, solution temperature and etching time. Thus, it is submitted Lee et al. actually teaches away from the claimed invention, and the combination of Suguro and Lee et al. does not achieve or render obvious the claimed invention.

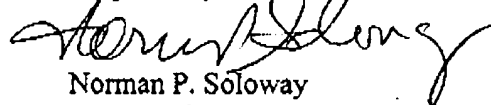
The foregoing Amendment makes no claim changes that would require further search by the Examiner. Thus, entry of the foregoing Amendment and allowance of the Application are respectfully requested.

Having dealt with all the objections raised by the Examiner, the Application is believed to be in order for allowance. Early and favorable action are respectfully requested.

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In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account Number 08-1391.

Respectfully submitted,



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